

This Page Is Inserted by IFW Operations  
and is not a part of the Official Record

## **BEST AVAILABLE IMAGES**

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images may include (but are not limited to):

- BLACK BORDERS
- TEXT CUT OFF AT TOP, BOTTOM OR SIDES
- FADED TEXT
- ILLEGIBLE TEXT
- SKEWED/SLANTED IMAGES
- COLORED PHOTOS
- BLACK OR VERY BLACK AND WHITE DARK PHOTOS
- GRAY SCALE DOCUMENTS

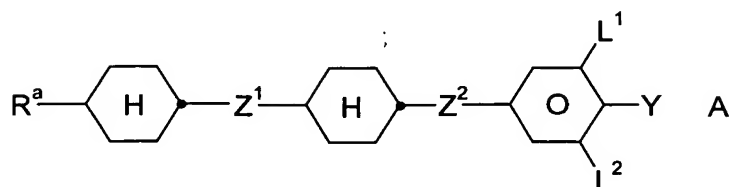
**IMAGES ARE BEST AVAILABLE COPY.**

**As rescanning documents *will not* correct images,  
please do not report the images to the  
Image Problem Mailbox.**

# Patent Claims

1. A liquid-crystalline medium comprising one or more compounds of formula A

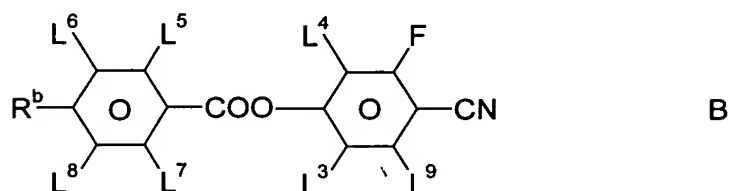
5



10

and at least one compound of formula B

15



20

in which

$R^a$  and  $R^b$  are each, independently of one another, H or an alkyl radical having 1 to 12 carbon atoms which is unsubstituted or monosubstituted by CN or  $CF_3$ , or at least monosubstituted by halogen, in which one or more  $CH_2$  groups are optionally, independently of one another, replaced by  $-O-$ ,  $-S-$ ,  $-\text{cyclohexyl}-$ ,  $-\text{CH}=\text{CH}-$ ,  $-\text{C}\equiv\text{C}-$ ,  $-\text{CO}-$ ,  $-\text{CO}-\text{O}-$ ,  $-\text{O}-\text{CO}-$  or  $-\text{O}-\text{CO}-\text{O}-$  in such a way that O atoms are not linked directly to one another,

25

30

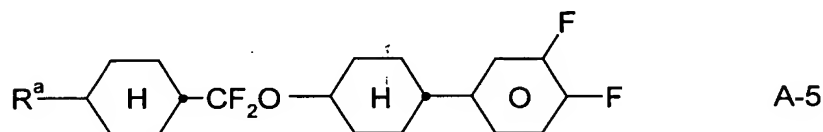
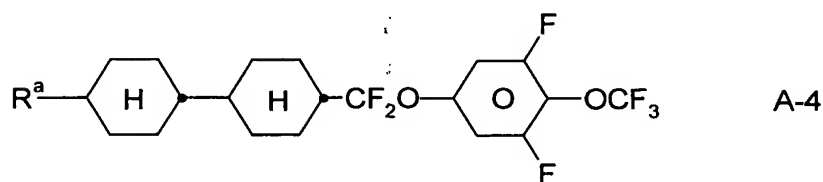
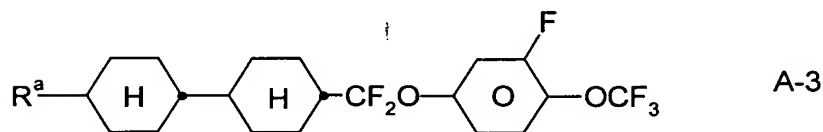
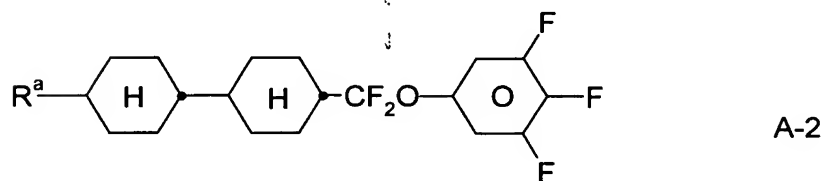
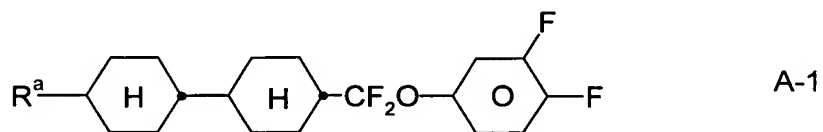
$Z^1$  and  $Z^2$  are each, independently of one another,  $-(CH_2)_4-$ ,  $-\text{CF}_2\text{O}-$ ,  $-\text{COO}-$ ,  $-\text{OCF}_2-$ ,  $-\text{OCH}_2-$ ,  $-\text{CH}_2\text{O}-$ ,  $-\text{CH}_2-$ ,  $-(CH_2)_3-$  or a single bond, wherein at least one of  $Z^1$  and  $Z^2$  is  $-\text{OCF}_2-$  or  $-\text{CF}_2\text{O}-$ ,

35

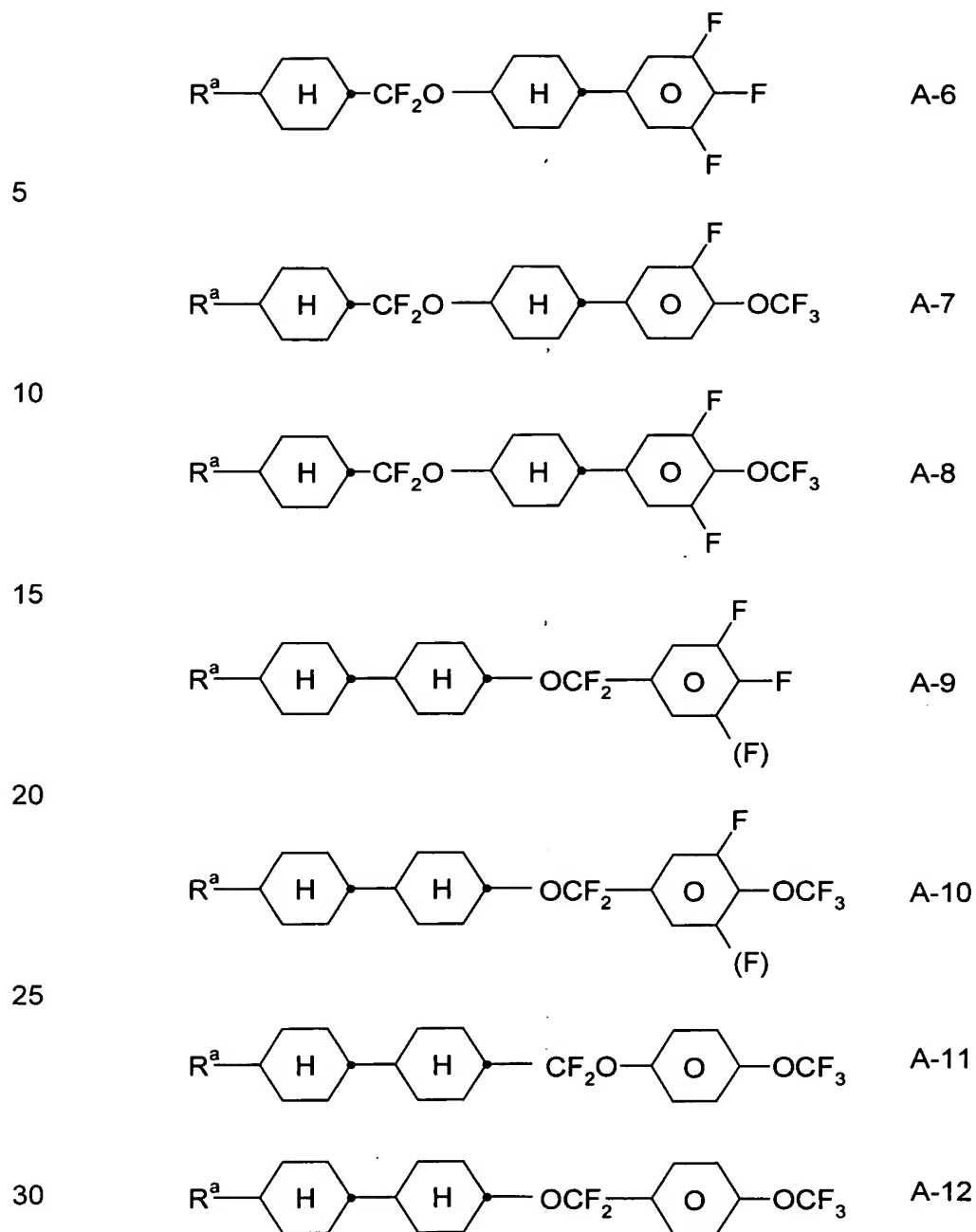
$L^1$  to  $L^9$  are each, independently of one another, H or F, and

Y is F, Cl,  $SF_5$ , NCS, OCN, CN, SCN, or a monohalogenated or polyhalogenated alkyl, alkoxy, alkenyl or alkenyloxy radical, each having up to 5 carbon atoms.

2. A liquid-crystalline medium according to Claim 1, comprising a compound of formulae A-1 to A-12

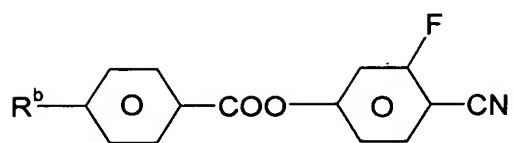


35



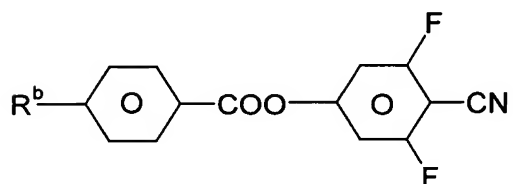
in which  $R^a$  is as defined in Claim 1.

3. A liquid-crystalline medium according to Claim 1, comprising a compound of formulae B-1 to B-6



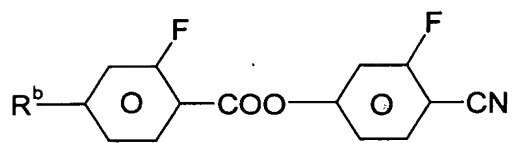
B-1

5



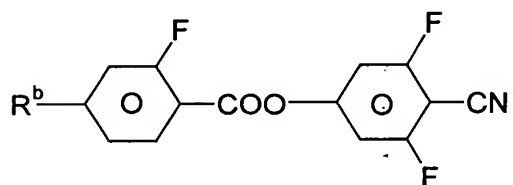
B-2

10



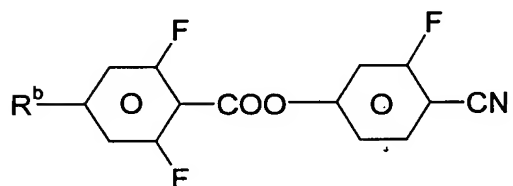
B-3

15



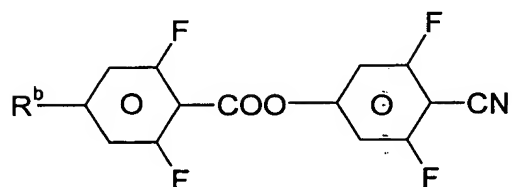
B-4

20



B-5

25



B-6

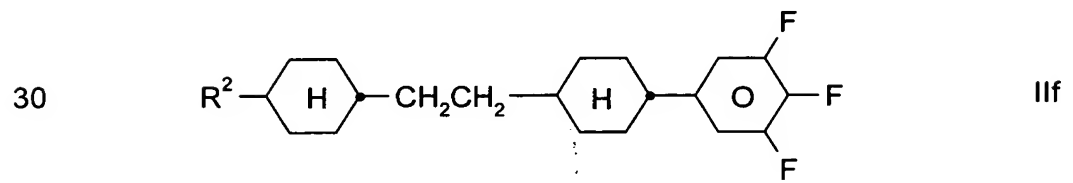
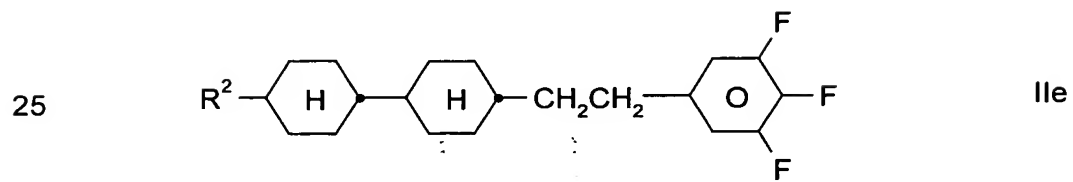
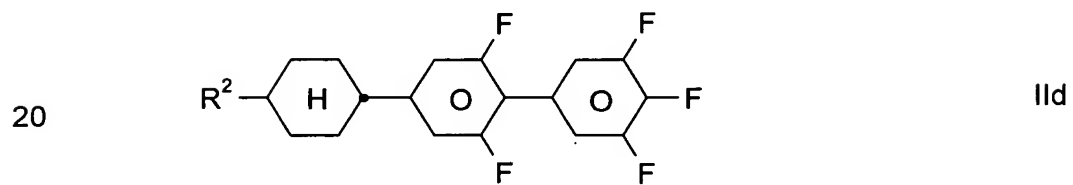
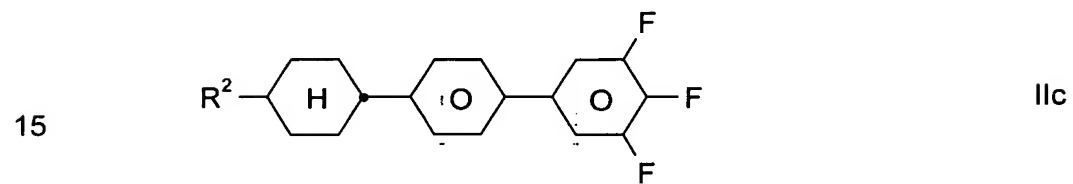
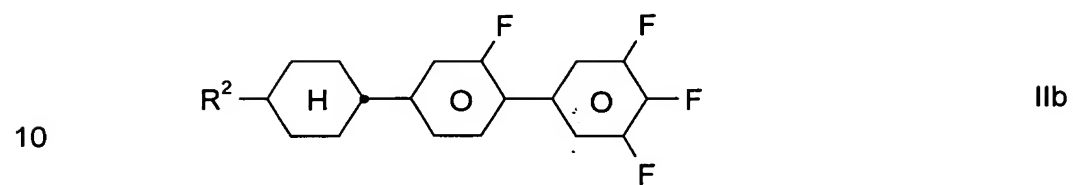
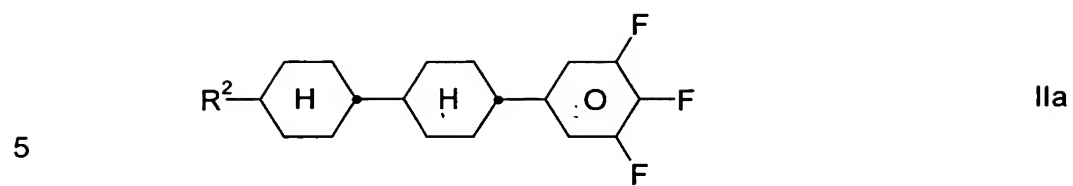
30

in which

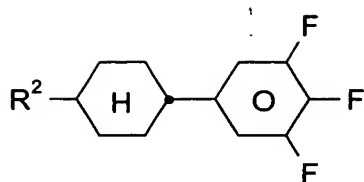
$R^b$  is as defined in Claim 1.

35

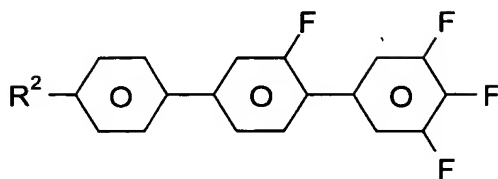
4. A liquid-crystalline medium according to Claim 1, further comprising a compound of formulae IIa to IIj



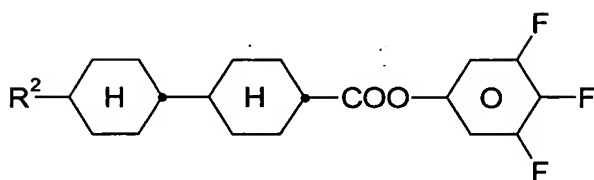
35



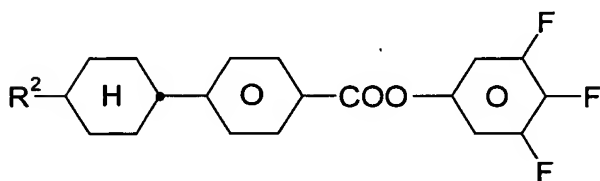
IIg



IIh




IIi

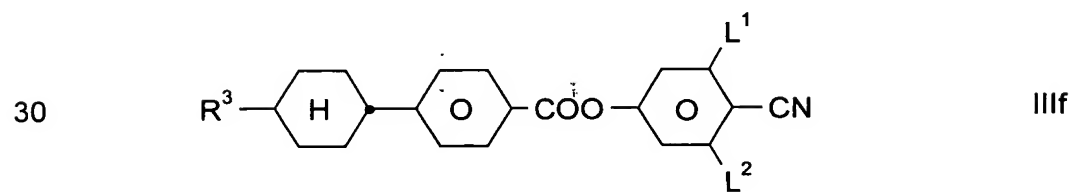
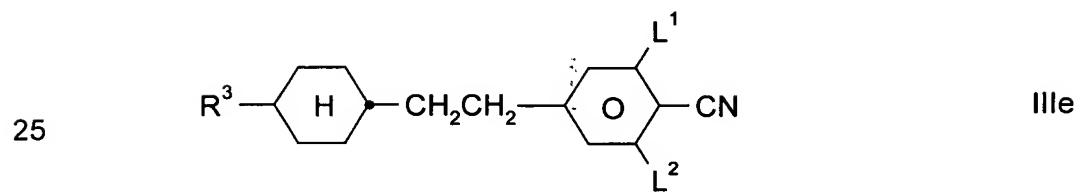
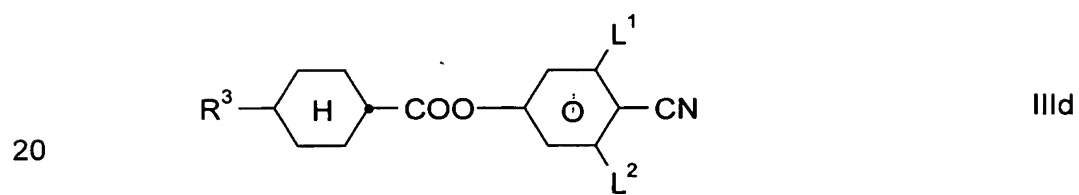
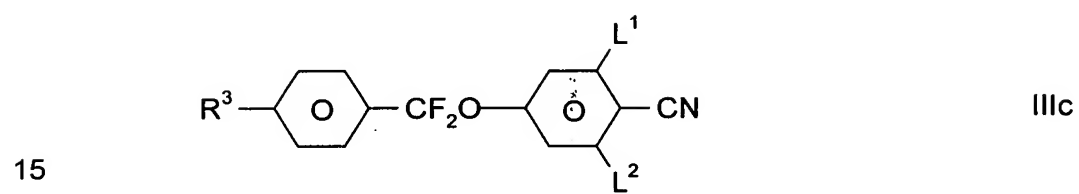
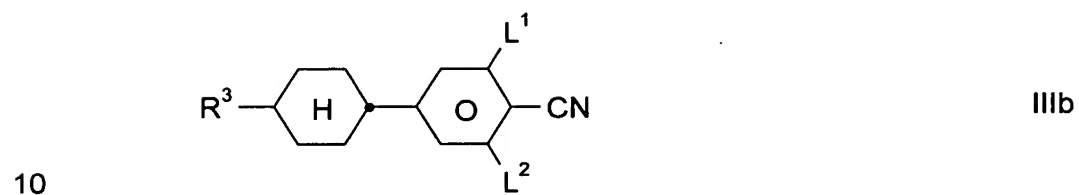
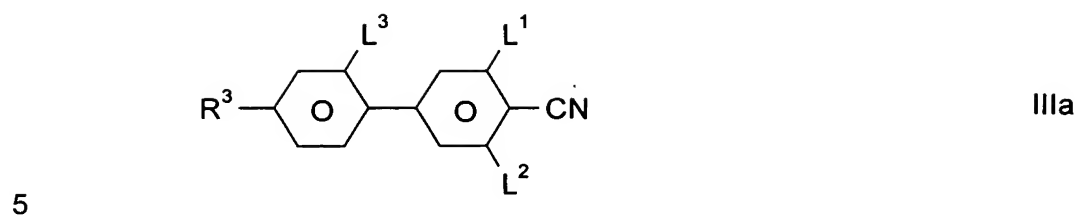


IIj

in which

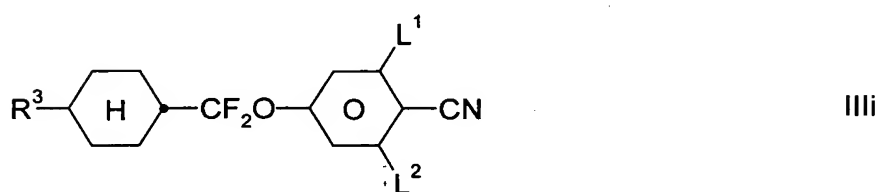
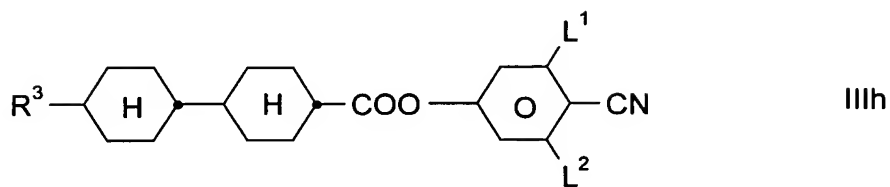
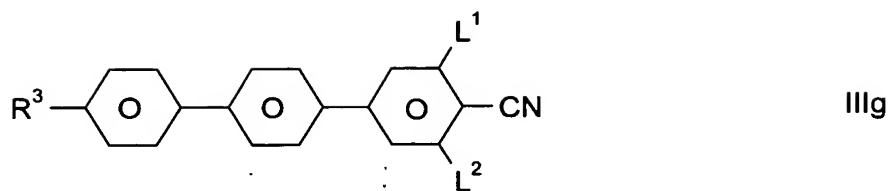
R<sup>2</sup> is an alkyl radical having 1 to 12 carbon atoms which is unsubstituted or monosubstituted by CN or CF<sub>3</sub>, or at least monosubstituted by halogen, in which one or more CH<sub>2</sub> groups are optionally, independently of one another, replaced by -O-, -S-, , -CH=CH-, -C≡C-, -CO-, -CO-O-, -O-CO- or -O-CO-O- in such a way that O atoms are not linked directly to one another.

5. A liquid-crystalline medium according to Claim 1, further comprising a cyano compound of formulae IIIa to IIIi



35





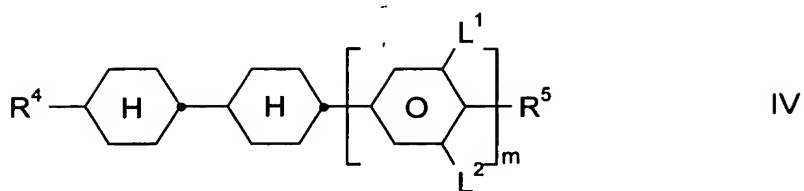
in which

20       $R^3$       is an alkyl radical having 1 to 12 carbon atoms which is unsubstituted or monosubstituted by CN or  $CF_3$ , or at least monosubstituted by halogen, in which one or more  $CH_2$  groups are optionally, independently of one another, are replaced by  $-O-$ ,  $-S-$ ,  $\text{—}\diamond\text{—}$ ,  $-CH=CH-$ ,  $-C\equiv C-$ ,  $-CO-$ ,  
25       $-CO-O-$ ,  $-O-CO-$  or  $-O-CO-O-$  in such a way that O atoms are not linked directly to one another, and

30       $L^1, L^2$   
and  $L^3$       are each, independently of one another, H or F.

6. A liquid-crystalline medium according to Claim 1, further comprising a compound of formula IV

35



in which

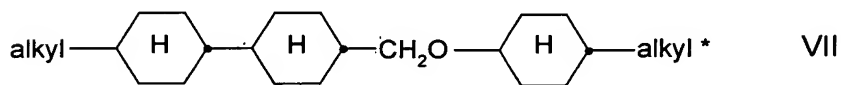
$m$  is 0 or 1,

$R^4$  is an alkenyl group having 2 to 7 carbon atoms,

$R^5$  is defined as  $R^a$  in claim 1, or, when  $m$  is 1, is alternatively F, Cl,  $CF_3$  or  $OCF_3$ , and

$L^1$  and  $L^2$  are each, independently of one another, H or F.

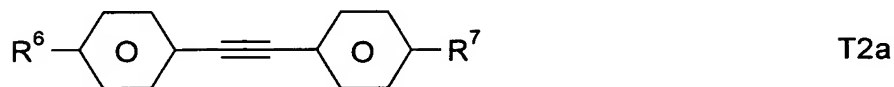
7. A liquid-crystalline medium according to Claim 1, further comprising a compound of formula VII

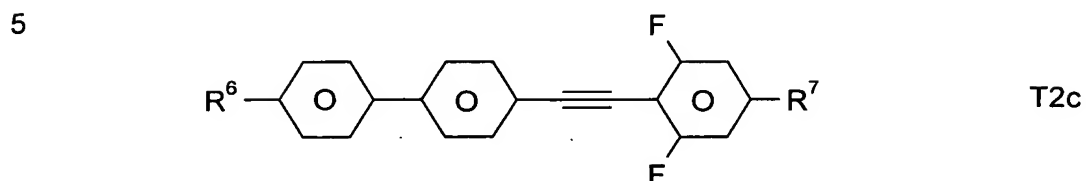
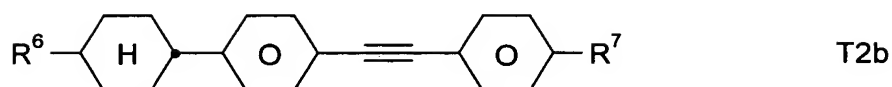


in which

alkyl and alkyl\* are each, independently of one another, an alkyl group having 1 to 7 carbon atoms.

8. A liquid-crystalline medium according to Claim 1, further comprising a tolan compound of formula T2a, T2b or T2c





10

in which

$R^6$  and  $R^7$  are each, independently of one another, an alkyl radical having 1 to 12 carbon atoms which is unsubstituted or monosubstituted by CN or  $\text{CF}_3$ , or at least monosubstituted by halogen, in which one or more  $\text{CH}_2$  groups are optionally, independently of one another, replaced by  $-\text{O}-$ ,  $-\text{S}-$ ,  $-\text{C}(\text{CH}_3)_2-$ ,  $-\text{CH}=\text{CH}-$ ,  $-\text{C}\equiv\text{C}-$ ,  $-\text{CO}-$ ,  $-\text{CO}-\text{O}-$ ,  $-\text{O}-\text{CO}-$  or  $-\text{O}-\text{CO}-\text{O}-$  in such a way that O atoms are not linked directly to one another.

9. A liquid-crystalline medium according to Claim 1, wherein the medium comprises 5-30% by weight of one or more compounds of formula A.
10. A liquid-crystalline medium according to Claim 1, wherein the medium comprises 5-30% by weight of one or more compounds of formula B.
11. A liquid-crystalline medium according to Claim 1, wherein the medium comprises more than 20% of compounds having a dielectric anisotropy of  $\Delta\epsilon \geq +12$ .
12. An electro-optical device comprising a liquid-crystalline medium according to Claim 1.
13. An electro-optical liquid-crystal display containing a liquid-crystalline medium according to Claim 1.

14. A TN or STN liquid-crystal display comprising

- 5                   – two outer plates, which, together with a frame, form a cell,
- a nematic liquid-crystal mixture of positive dielectric anisotropy located in the cell,
- electrode layers with alignment layers on the insides of the outer plates,
- 10               – a tilt angle between the longitudinal axis of the molecules at the surface of the outer plates and the outer plates of from 0 degree to 30 degrees, and
- a twist angle of the liquid-crystal mixture in the cell from alignment layer to alignment layer with a value of between 22.5°
- 15               and 600°, and
- a nematic liquid-crystal mixture comprising
  - 20               a) 15 – 75% by weight of a liquid-crystalline component A consisting of one or more compounds having a dielectric anisotropy of greater than +1.5;
  - b) 25 – 85% by weight of a liquid-crystalline component B consisting of one or more compounds having a dielectric anisotropy of between -1.5 and +1.5;
  - 25               c) 0 – 20% by weight of a liquid-crystalline component D consisting of one or more compounds having a dielectric anisotropy of below -1.5, and
  - d) optionally, an optically active component C in such an
  - 30               amount that the ratio between the layer thickness and the natural pitch of the chiral nematic liquid-crystal mixture is from about 0.2 to 1.3,

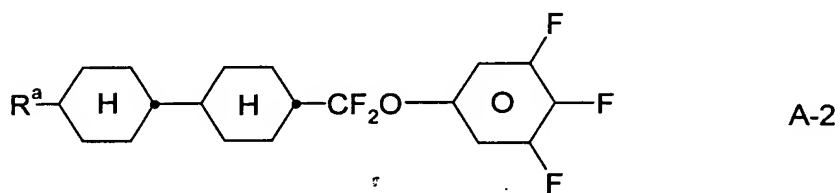
35               wherein component A is a liquid-crystalline medium according to claim 1.

15. A liquid-crystalline method according to claim 2, comprising a compound of formula A-2 or A-6.

5 16. A liquid-crystalline method according to claim 3, comprising a compound of formula B-1, B-2 or B-4.

17. A liquid-crystalline method according to claim 1, comprising a compound of formula A-2

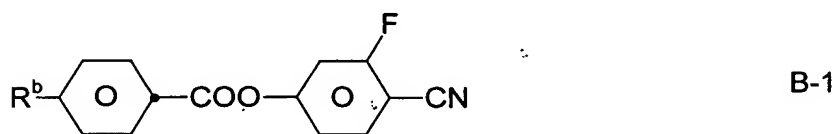
10



15

and a compound of formula B-1

20



25

wherein in  $R^a$  and  $R^b$  are as defined in claim 1.

30

18. A liquid-crystalline method according to claim 1, wherein the medium contains three homologous compounds of formula A.

35